

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-066327  
 (43)Date of publication of application : 19.03.1993

(51)Int.Cl. G02B 6/38  
 G02B 6/24

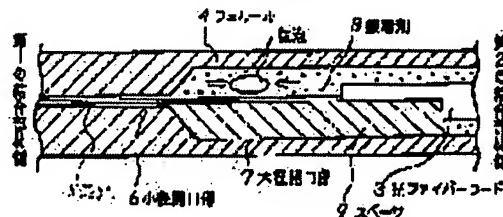
(21)Application number : 03-226682 (71)Applicant : TOSHIBA CORP  
 (22)Date of filing : 06.09.1991 (72)Inventor : SHIMIZU NORIO

## (54) OPTICAL CONNECTOR

## (57)Abstract:

**PURPOSE:** To use a general adhesive by removing the influence of an air bubble in the adhesive, which is charged to connect optical fibers to each other, upon an external force to the optical fibers.

**CONSTITUTION:** The optical connector consists of an optical fiber cord 3 which has a coated optical fiber 5 in the center and also has a jacket for external damage prevention at the periphery of the coated optical fiber 5, a cylindrical ferrule 4 where a large-diameter opening part 7 which is nearly equal in diameter to the coated optical fibers 5 and connects one coated optical fiber 5 to the other coated optical fiber 5 is formed in the center and a large-diameter opening part 7 which is larger in diameter than the optical fiber cord 3 is formed from a halfway point, a spacer 9 which is made of a plastic material and fitted along one optical fiber cord 3 and the coated optical fiber 5, and the adhesive which fixes the optical fiber cord 3 fitted with the spacer 9 and one coated optical fiber 5 at the large-diameter opening part 7 in the ferrule 4.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

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## [Claim(s)]

[Claim 1] The ferrule which forms the core wire of an optical-fiber code, and minor diameter opening of \*\*\*\*\* in a core from one side to the middle by the shape of a cylindrical shape, and forms an optical-fiber code and major-diameter opening of \*\*\*\*\* in a core from the middle at the side else, The 1st bond part material which this ferrule is attached and has inserted the core wire of an optical-fiber code in said minor diameter opening to the middle, In the case of connection The 2nd bond part material combined with said 1st bond part material so that the edge of other optical-fiber codes may be combined with the core wire of an optical-fiber code which inserts the core wire of an optical-fiber code besides the above, and is inserted to the middle of said minor diameter opening to the middle of said major-diameter opening to the through aforementioned minor diameter opening, the inside of said major-diameter opening -- said -- others -- the core wire of an optical-fiber code -- a wrap sake -- a core -- said -- others -- the optical connector characterized by consisting of a core wire of an optical-fiber code, and a spacer in which the slot of the diameter of said was formed.

[Claim 2] Said spacer is an optical connector according to claim 1 characterized by consisting of plastic material.

[Claim 3] The optical connector characterized by fixing the core wire of an optical-fiber code besides the above covered with said spacer and said spacer using adhesives in said major-diameter opening.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the optical connector for optical communication.

#### [0002]

[Description of the Prior Art] Generally, the optical connector is used for connection of connection between optical-fiber codes, an optical-fiber code, transmission equipment, etc. in optical communication. Drawing 3 shows the external view of an optical connector. The optical connector consists of the 1st bond part material 1 and 2nd bond part material 2. The 1st bond part material 1 mainly consists of an optical-fiber code 3 and a ferrule 4. The optical-fiber code 3 has a core wire 5 at the core, and forms the jacket for the damage prevention from the outside in the surroundings of it.

[0003] A ferrule 4 is a cylindrical shape-like, and forms a core wire 5 and the minor diameter opening 6 of the diameter of said in a core from one side to the middle, and has the optical-fiber code 3 and the major-diameter opening 7 of \*\*\*\*\* in an other end side from the middle. As for above-mentioned minor diameter opening 6 and major-diameter opening 7 part, the raised bottom is connected by the lower base with a radius of the major-diameter opening 7 in the configuration of the truncated cone which consists of a radius of the minor diameter opening 6. Drawing 4 shows the sectional view of the ferrule at the time of the 1st bond part material and the 2nd bond part material being connected.

[0004] It inserts to the middle of the minor diameter opening 6 of the core wire 5 and the diameter of said which have the tip of one core wire 5 in the core of a ferrule 4 in which it is attached by the 1st bond part material 1. The optical-fiber code 1 of another side From the major-diameter opening 7 in a ferrule 4 to through The core wire 2 at a tip is inserted in the minor diameter opening 6 which it has in the core of a ferrule 4. It compares with the tip of the core wire 2 of the method of Norikazu when beforehand inserted into a ferrule 4, and the space produced between the major-diameter opening 7 in a ferrule 4, the optical-fiber code 3, and a core wire 5 is filled up with adhesives 8, and it fixes to it.

#### [0005]

[Problem(s) to be Solved by the Invention] As mentioned above, in case adhesives are filled up with the conventional optical connector into the adhesives restoration section, it is easy to generate minute air bubbles, and in order for these air bubbles to stiffen adhesives, air bubbles tend to become large with heating. And if it hardens in adhesives after these air bubbles have gathered near a core wire, a core wire may result in fracture with the time-honored bending stress by the external force from the adhesives around air bubbles. Therefore, in selection of the adhesives with which the space produced in a ferrule is filled up, there was much constraint with a glass transition temperature the volume change at the time of resin hardening is small, and high, and when filling up with adhesives the space produced in a ferrule, there was a problem for which the processing which removes air bubbles is needed. Then, the purpose of this invention offers the optical connector which enables use of general adhesives by removing the effect of the external force to the core wire by the air bubbles of adhesives.

#### [0006]

[Means for Solving the Problem] This invention forms the core wire of an optical-fiber code, and minor diameter opening of \*\*\*\*\* in a core from one side to the middle by the shape of a cylindrical shape, in order to attain the above purpose. The ferrule which forms an optical-fiber code and major-diameter opening of \*\*\*\*\* in a core from the middle at the side else, The 1st bond part material which this ferrule is attached and has inserted the core wire of an optical-fiber code in minor diameter opening to the middle, The 2nd bond part material combined with the 1st bond part material so that the edge of other optical-fiber codes may be combined with the core wire of an optical-fiber code which inserts the core wire of an optical-fiber code and is inserted to the middle of minor diameter opening to the middle of

major-diameter opening to through minor diameter opening in the case of connection. The spacer which consists the core wire of other optical-fiber codes of plastic material which formed the slot of the diameter of said in the core for the wrap reason within major-diameter opening. It is in offering the optical connector characterized by consisting of adhesives which fix the optical-fiber code and core wire which are attached in this spacer in major-diameter opening circles.

[0007]

[Function] By covering the core wire of an optical-fiber code with a spacer, and fixing to the major-diameter opening circles in a ferrule by the above configuration, even if the air bubbles in adhesives are generated near a core wire, bending stress is not given to a core wire, and damage is not done to a core wire.

[0008]

[Example] Hereafter, the example of this invention is explained with reference to a drawing. Drawing 3 shows the external view of an optical connector. The optical connector consists of the 1st bond part material 1 and 2nd bond part material 2. The 1st bond part material 1 mainly consists of an optical-fiber code 3 and a ferrule 4. The optical-fiber code 3 has a core wire 5 at the core, and forms the jacket for the damage prevention from the outside in the surroundings of it.

[0009] A ferrule 4 is a cylindrical shape-like, and forms a core wire 5 and the minor diameter opening 6 of the diameter of said in a core from one side to the middle, and has the optical-fiber code 3 and the major-diameter opening 7 of \*\*\*\*\* in an other end side from the middle. As for above-mentioned minor diameter opening 6 and major-diameter opening 7 part, the raised bottom is connected by the lower base with a radius of the major-diameter opening 7 in the configuration of the truncated cone which consists of a radius of the minor diameter opening 6. Drawing 1 shows the sectional view of the ferrule of this example at the time of connecting the 1st bond part material 1 and 2nd bond part material 2 which have been shown in drawing 3.

[0010] It inserts to the middle of the minor diameter opening 6 of the core wire 5 and \*\*\*\*\* which have the tip of one core wire 5 in the core of a ferrule 4 in which it is attached by the 1st bond part material 1, and is a spacer 9 (later). it explains to a detail. It compares with the tip of the core wire 5 of the method of Norikazu when the optical-fiber code 3 of another side attached the description picking is inserted from the major-diameter opening 7 in a ferrule 4, it inserts in the minor diameter opening 6 which has the core wire 5 at a tip in the core of a ferrule 4 and it is beforehand inserted into a ferrule 4. And the space produced between the major-diameter opening 7 of a ferrule 4, the optical-fiber code 3, a core wire 5, and a spacer 9 is filled up with adhesives 8, and it fixes to it.

[0011] Drawing 2 shows the external view of the above-mentioned spacer 9, and has formed it in one flat surface of a semicircle drill at which the outer diameter met the configuration of a truncated cone where only the point was formed with the major-diameter opening 7 and the diameter of said between the minor diameter opening 6 in a ferrule 4, and the major-diameter opening 7, in the slot a of a core wire 5 and the diameter of said, and the optical-fiber code 3 and the slot b of the diameter of said.

[0012] The outer diameter of the spacer 9 of this example may be smaller than the outer diameter of the major-diameter opening 7, as long as the core wire is covered with fang furrow a and Slot b which are the major-diameter opening 7 and \*\*\*\*\*. Moreover, by this example, although only the semicircle column and the point also make the configuration of a spacer 9 the semicircle drill, it is covered with core wire 5 fang-furrow a, and it is not limited to the above-mentioned configuration, either.

[0013] Moreover, in the ferrule 4 of this example, although the connection parts of the minor diameter opening 6 and the major-diameter opening 7 are made into the truncated-cone form, it is not limited to the above-mentioned configuration, either. for example, the connection parts of the minor diameter opening 6 and the major-diameter opening 7 -- a curved surface (semicircle spherical \*\*) -- even if -- it is good.

[0014]

[Effect of the Invention] According to this invention, within the ferrule of an optical connector, in case it is filled up with adhesives, a core wire Since the bending stress from the side which air bubbles produced with the spacer attached along with a core wire is not added even if adhesives harden, while the air bubbles in adhesives had arisen near [ this ] the core wire Even if it is not special adhesives with a high glass transition temperature with the small volume change at the time of resin hardening used conventionally, damage by the fixed portion of the core wire in the ferrule of an optical connector can be prevented, and a reliable optical connector can be offered.

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TECHNICAL FIELD

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**PRIOR ART**

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[Description of the Prior Art] Generally, the optical connector is used for connection of connection between optical-fiber codes, an optical-fiber code, transmission equipment, etc. in optical communication. Drawing 3 shows the external view of an optical connector. The optical connector consists of the 1st bond part material 1 and 2nd bond part material 2. The 1st bond part material 1 mainly consists of an optical-fiber code 3 and a ferrule 4. The optical-fiber code 3 has a core wire 5 at the core, and forms the jacket for the damage prevention from the outside in the surroundings of it.

[0003] A ferrule 4 is a cylindrical shape-like, and forms a core wire 5 and the minor diameter opening 6 of the diameter of said in a core from one side to the middle, and has the optical-fiber code 3 and the major-diameter opening 7 of \*\*\*\*\* in an other end side from the middle. As for above-mentioned minor diameter opening 6 and major-diameter opening 7 part, the raised bottom is connected by the lower base with a radius of the major-diameter opening 7 in the configuration of the truncated cone which consists of a radius of the minor diameter opening 6. Drawing 4 shows the sectional view of the ferrule at the time of the 1st bond part material and the 2nd bond part material being connected.

[0004] It inserts to the middle of the minor diameter opening 6 of the core wire 5 and the diameter of said which have the tip of one core wire 5 in the core of a ferrule 4 in which it is attached by the 1st bond part material 1. The optical-fiber code 1 of another side From the major-diameter opening 7 in a ferrule 4 to through The core wire 2 at a tip is inserted in the minor diameter opening 6 which it has in the core of a ferrule 4. It compares with the tip of the core wire 2 of the method of Norikazu when beforehand inserted into a ferrule 4, and the space produced between the major-diameter opening 7 in a ferrule 4, the optical-fiber code 3, and a core wire 5 is filled up with adhesives 8, and it fixes to it.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] According to this invention, within the ferrule of an optical connector, in case it is filled up with adhesives, a core wire Since the bending stress from the side which air bubbles produced with the spacer attached along with a core wire is not added even if adhesives harden, while the air bubbles in adhesives had arisen near [ this ] the core wire Even if it is not special adhesives with a high glass transition temperature with the small volume change at the time of resin hardening used conventionally, damage by the fixed portion of the core wire in the ferrule of an optical connector can be prevented, and a reliable optical connector can be offered.

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#### TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] As mentioned above, in case adhesives are filled up with the conventional optical connector into the adhesives restoration section, it is easy to generate minute air bubbles, and in order for these air bubbles to stiffen adhesives, air bubbles tend to become large with heating. And if it hardens in adhesives after these air bubbles have gathered near a core wire, a core wire may result in fracture with the time-honored bending stress by the external force from the adhesives around air bubbles. Therefore, in selection of the adhesives with which the space produced in a ferrule is filled up, there was much constraint with a glass transition temperature the volume change at the time of resin hardening is small, and high, and when filling up with adhesives the space produced in a ferrule, there was a problem for which the processing which removes air bubbles is needed. Then, the purpose of this invention offers the optical connector which enables use of general adhesives by removing the effect of the external force to the core wire by the air bubbles of adhesives.

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## MEANS

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[Means for Solving the Problem] This invention forms the core wire of an optical-fiber code, and minor diameter opening of \*\*\*\*\* in a core from one side to the middle by the shape of a cylindrical shape, in order to attain the above purpose. The ferrule which forms an optical-fiber code and major-diameter opening of \*\*\*\*\* in a core from the middle at the side else, The 1st bond part material which this ferrule is attached and has inserted the core wire of an optical-fiber code in minor diameter opening to the middle, The 2nd bond part material combined with the 1st bond part material so that the edge of other optical-fiber codes may be combined with the core wire of an optical-fiber code which inserts the core wire of an optical-fiber code and is inserted to the middle of minor diameter opening to the middle of major-diameter opening to through minor diameter opening in the case of connection, The spacer which consists the core wire of other optical-fiber codes of plastic material which formed the slot of the diameter of said in the core for the wrap reason within major-diameter opening, It is in offering the optical connector characterized by consisting of adhesives which fix the optical-fiber code and core wire which are attached in this spacer in major-diameter opening circles.

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OPERATION

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[Function] By covering the core wire of an optical-fiber core with a spacer, and fixing to the major-diameter opening circles in a ferrule by the above configuration, even if the air bubbles in adhesives are generated near a core wire, bending stress is not given to a core wire, and damage is not done to a core wire.

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## EXAMPLE

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The ferrule sectional view of the optical connector of this example

[Drawing 2] The spacer external view of this example

[Drawing 3] The external view of an optical connector

[Drawing 4] The ferrule sectional view of the conventional optical connector

[Description of Notations]

1 [ -- A ferrule, 5 / -- A core wire, 6 / -- Minor diameter opening, 7 / -- Major-diameter opening, 8 / -- Adhesives, 9 / -- A spacer, a b / -- Slot. ] -- The 1st bond part material, 2 -- The 2nd bond part material, 3 -- An optical-fiber code, 4

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[Translation done.]